

Minimizing arsenic in drinking water and food in Bangladesh

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Reductive dissolution of arsenic-rich iron(hydr)oxides is recognized as the most important source of arsenic (As) in groundwaters in Bangladesh and in other regions with similar aquifers. As-containing groundwater pumped to the surface for drinking, and in large quantities for irrigation, has detrimental effects on the health of tens of millions of people who consume As-containing drinking water and food. Measures to mitigate As exposure are the targeting of aquifers with lower As-concentrations, minimizing As in soil porewater, and As removal from drinking water. Lower aquifers targeted by deep tubewells have to be localized carefully to minimize As and other unwanted solutes such as manganese and salt, and they need to be reserved exclusively for drinking water, to avoid high-volume water abstraction and inflow of As from overlying aquifers [1]. This leaves shallow aquifers with high As-concentrations as the often only source of water for irrigation and drinking. Measures to lower As-concentrations can take advantage of reversing the process of As-mobilization by the natural oxidation of Fe(II) and As(III) when water comes in contact with air and the subsequent adsorption of As on forming Fe(III)(hydr)oxide phases. By appropriate agricultural practices, such as intermittent irrigation and raised bed cultivation, exposure of plant roots to dissolved As(III) and thus the uptake of As can be minimized [2]. In water treatment, the oxidation of naturally present Fe(II) can lower As-concentrations, but additional adsorbents or additional iron in various forms is often needed to provide sufficient amounts of adsorbents for the removal of As and competing phosphate [3]. This presentation will give an overview of the underlying reactions in the cycling of arsenic, iron, phosphate, sulfate, oxygen and dissolved organic carbon and of the success of various mitigation measures implemented to lower human exposure to As in affected regions.

[1] Hug, S.J. et al., *Appl. Geochem.* **2011**, 26, 1077-1085.

[2] Roberts, L.C. et al., *Environ. Sci. Technol.* **2011**, 45, 971-976. [3] Neumann, A. et al., *Environ. Sci. Technol.* **2013**, 47, 4544-4554.